

**CLADIUM MARISCOIDES (CYPERACEAE) IN THE WESTERN FLORIDA
PANHANDLE AND ITS PHYTOGEOGRAPHIC SIGNIFICANCE**

Edwin L. Bridges

Florida Department of Environmental Regulation, 2600 Blair Stone Rd.,
Tallahassee, Florida 32399 U.S.A.

Steve L. Orzell

Florida Natural Areas Inventory, 1018 Thomasville Rd., Suite 200-C,
Tallahassee, Florida 32303 U.S.A.

James R. Burkhalter

The Herbarium, University of West Florida, Pensacola, Florida 32514 U.S.A.

ABSTRACT

Cladium mariscoides (Muhl.) Torr. (Cyperaceae), recently reported as new to the flora of Florida, is discussed for the six currently known extant stations from Santa Rosa and Okaloosa counties in the western Florida panhandle. In Florida *Cladium mariscoides* occurs in areas of poorly drained, fire frequented wetland pine savannas on the outer coastal terraces of the Gulf Coastal Lowlands. It is locally abundant there on wet peaty sands of herbaceous dominated ecotonal communities above pond cypress depressions and in open canopied pond cypress swales. The associated species and phytogeographical significance of the Florida populations are discussed.

KEY WORDS: *Cladium mariscoides*, Cyperaceae, Florida, phyto-
geography, disjunctions

Cladium mariscoides (Muhl.) Torr. is a perennial, rhizomatous sedge commonly found in the northeastern states and Great Lakes region, but rare in unglaciated areas (its habitat and range relationships are reviewed in Bridges & Orzell 1989, pg. 21-22). Although Florida is cited in the range of *C.*

mariscoides by several published floras, and it is included in a Florida flora checklist by Ward (1968), we have found no specific specimen citations for these reports. Bruce Hansen (pers. comm.) suggests that the Florida reports may be attributable only to a specimen by Baldwin from "St. Mary's", with no state specifically cited. This specimen may have been collected either in Florida or Georgia. Anderson (1991) reported *C. mariscoides* as new to Florida based upon a specimen collected by Burkhalter (11500, FSU, FLAS, UWFP) from Santa Rosa County, east of Gulf Breeze near Tiger Point Village subdivision, where he first discovered it on July 2, 1989. Orzell and Bridges later collected *C. mariscoides* from three other sites on the Garcon Point Peninsula in Santa Rosa County. After the senior authors informed J.R. Burkhalter of one of the Garcon Point locations, he visited the same site and made a collection. John Palis made a 1992 collection from an additional site near the Orzell and Bridges sites on Garcon Point. Steve Orzell and Richard Eilers recently added Okaloosa County to the Florida range of *C. mariscoides*. In addition to the collection sites reported below, Richard Eilers (pers. comm.) has reported observing this species at other wetland savanna sites on Eglin Air Force Base in Santa Rosa and Okaloosa counties. The collection data for our Florida specimens are as follows:

Cladium mariscoides (Muhl.) Torr. (Cyperaceae). UNITED STATES. Florida: Okaloosa Co.: Open wetland savanna surrounding a pond cypress depression pond, N of unnamed E-W road, ca. 0.3 mi E of Santa Rosa Co. line, ca. 0.5 mi S of East Bay River, ca. 1.7 air mi NW of jct paved Eglin Range Rd. 259 and US Hwy. 98 near Wynnehaven Beach; Eglin Air Force Base; NWQ, SWQ, SEQ, SWQ, Sec. 7, T2S, R25W; Navarre 7.5' USGS Quad.; 30°25'31" N, 86°47'40" W; Elev. 26 ft.; 12 Oct 1992, Orzell & R. Eilers 21086 (USF, TEX); Santa Rosa Co.: Tiger Point site: Roadside ditch and margin of low roadside through wet flatwoods, on S side of US Hwy. 98, ca. 2.2 mi E of jct Co. Rd. 191-A (Oriole Beach Rd.), ca. 4.1 mi E of E city limit of Gulf Breeze and ca. 7 air mi E of jct FL Hwy. 399 in Gulf Breeze; SEQ, SWQ, NWQ, Sec. 27, T2S, R28W; Garcon Point 7.5' USGS Quad.; 30°23'31" N, 87°02'57" W; Elev. 21 ft.; 2 July 1989, J.R. Burkhalter 11480 (UWFP); 16 July 1989, J.R. Burkhalter 11500 (FLAS, FSU, UWFP); 23 June 1990, J.R. Burkhalter 11980 (UWFP); 9 July 1990, Orzell & Bridges 14239 (FTG, FSU, TEX); Garcon Point sites 1-4: (1) Burned herbaceous ecotone above pond cypress (*Taxodium ascendens* Brongn.) strand on N side of Dickerson City Rd., 0.4 mi E of FL Hwy. 191 at a point 6.7 mi SW of jct with Int. Hwy. 10, 0.6 mi N of jct FL Hwy. 281 on Garcon Point; NEQ, NEQ, NEQ, Sec. 24, T1S, R28W; Garcon Point 7.5' USGS Quad.; 30°29'04" N, 87°04'10" W; Elev. 16-19 ft.; 9 July 1990, Orzell & Bridges 14237 (FLAS, FTG, GA, IBE, MO, NCU, S, SMU, TEX, VDB); 5 Aug 1990, J.R. Burkhalter 12199 (UWFP); (2) Open wetland savanna surrounding a pond cypress strand, on E side of FL Hwy. 191, ca. 0.4 mi S of jct FL Hwy. 281, on Garcon Point, ca. 4.5 mi S of jct FL Hwy. 281 and Int. Hwy. 10 at

Avalon Beach, ca. 10 mi S of Milton; SEQ, SWQ, SWQ, Sec. 24, T1S, R28W; Garcon Point USGS Quad.; 30°28'21" N, 87°04'56" W; Elev. 10 ft; 18 July 1992, *Orzell & Bridges 20283* (TEX); (3) Open wetland savanna, planted in slash pine, along side road ca. 0.2 mi W of FL Hwy. 281 at a point 1.2 mi S of jct Int. Hwy. 10 at Avalon Beach, N of Trout Bayou and S of Indian Bayou; SW part of Sec. 10, T1S, R28W; Milton South 7.5' USGS Quad., 30°31'00" N, 87°05'29" W; Elev. 5-7 ft.; 31 July 1992, *Bridges 20284* (TEX); (4) Open-canopied pond cypress swale in open wetland savanna, on W side of FL Hwy. 191, 6.1 mi S of jct Int. Hwy. 10, 0.7 mi S of Wilson Memorial Ch. and 1.2 mi N of jct FL Hwy. 281; SEQ, SWQ, Sec. 19, T1S, R28W; Garcon Point USGS 7.5' Quad.; 30°29'28" N, 87°04'05" W; Elev. 15-20 ft; 18 June 1992, *J. Palis s.n.* (USF).

Only one other species of *Cladium*, *C. jamaicense* Crantz, occurs in the southeastern United States. Since *C. mariscoides* is not treated in Godfrey & Wooten (1979) we provide a key to distinguish the two species.

1. Plants 1-3 m tall, coarse, forming dense tussocks and often in dense colonies; leaves 5-12 mm wide, stiff and flat, the margins and midrib beneath harshly serrate (saw toothed); inflorescence a narrow panicle 3-9 dm long, the flaring rays bearing several fascicles of spikelets; achene obovoid to subglobose, the truncate base not flaring.
 *Cladium jamaicense* Crantz
1. Plants 0.4-1 m tall, relatively delicate, stoloniferous, the colonies more open; leaves 1-3 mm wide, channeled, margins only slightly scabrous; inflorescence 0.5-3 dm long, of 2-4 umbelliform cymes, the rays rigidly ascending and bearing simple glomerules of spikelets; achenes miter shaped (cylindric), the truncate bases slightly flaring.
 *Cladium mariscoides* (Muhl.) Torr.

All of the Florida sites for *Cladium mariscoides* are on outer coastal terraces of the Gulf Coastal Lowlands physiographic region less than one mile from tidally influenced water bodies including Pensacola Bay, East Bay, Escambia Bay, Santa Rosa Sound, and the East Bay River. The Garcon Point sites lie within an extensive area of poorly drained, fire frequented, wetland pine savanna that, prior to timbering, was dominated by widely scattered *Pinus palustris* P. Mill., with abundant pitcher plants (*Sarracenia flava* L., *S. leucophylla* Raf., and *S. psittacina* Michx.), interspersed with pond cypress (*Taxodium ascendens*) dome swamps, sloughs and depressional swales. *Cladium mariscoides* occurs there on wet peaty sand (Rains soil series - Typic Paleaquults) of herbaceous dominated ecotones above *Taxodium ascendens* dominated depressions. Associated species recorded by the senior authors at the Garcon Point sites include *Amphicarpum muhlenbergianum* (Schult.) Hitchc., *Anthaenantia rufa*

(Ell.) Schult., *Aristida affinis* (Schult.) Kunth, *Aristida stricta* Michx., *Baldina uniflora* Nutt., *Bigelovia nudata* (Michx.) DC., *Calamovilfa curtissii* (Vasey) Scribn., *Clethra alnifolia* L., *Coreopsis linifolia* Nutt., *Ctenium aromaticum* (Walt.) Wood, *Eleocharis equisetoides* (Ell.) Torr., *Eriocaulon compressum* Lam., *Eriocaulon decangulare* L., *Eupatorium leucolepis* (DC.) Torrey & Gray, *Euthamia minor* (Michx.) E. Greene, *Helianthus heterophyllus* Nutt., *Hypericum brachyphyllum* (Spach) Steud., *Hypericum cistifolium* Lam., *Hypericum myrtifolium* Lam., *Ilex glabra* (L.) A. Gray, *Ilex myrtifolia* Walt., *Juncus marginatus* Rostk., *Lachnanthes caroliniana* (Lam.) Dandy, *Lobelia floridana* Chapm., *Lophiola aurea* Ker-Gawl., *Ludwigia virgata* Michx., *Mitreola angustifolia* (Torrey & Gray) J. Nelson, *Myrica cerifera* L., *Ozypolis filiformis* (Walt.) Britt., *Panicum dichotomum* L., *Panicum scabrisculum* Ell., *Panicum virgatum* L., *Pinguicula planifolia* Chapm., *Pluchea rosea* Godfrey, *Polygala cruciata* L., *Polygala cymosa* Walt., *Polygala lutea* L., *Rhezia alifanus* Walt., *Rhezia lutea* Walt., *Rhezia virginica* L., *Rhynchospora corniculata* (Lam.) A. Gray, *Rhynchospora elliottii* A. Dietr., *Rhynchospora latifolia* (Ell.) Thomas, *Rhynchospora plumosa* Ell., *Sabatia bartramii* Wilbur, *Sabatia macrophylla* Hook., *Sarracenia leucophylla*, *Sarracenia* × *mooreana* Veitch, *Sarracenia psittacina*, *Scleria baldwinii* (Torr.) Steud., *Smilax walteri* Pursh, *Styrax americana* Lam., *Utricularia juncea* Vahl., *Xyris serotina* Chapm., and *X. stricta* Chapm. At the Tiger Point site *Cladium mariscoides* occurs on wet peaty sand (Rutlege soil series - Typic Humaquepts) in a *Pinus elliottii* Engelm. wet flatwoods with a groundcover dominated by *Aristida stricta*, and in a roadside ditch through the wet flatwoods. The habitat, soil type, and associated species at the Eglin Air Force Base site are very similar to the above sites, but a complete list of associated species has not been compiled due to the late season collecting date. We have recorded a total of 74 vascular plant taxa growing in close association with *Cladium mariscoides* (66 taxa at the Garcon Point sites and 32 taxa at Tiger Point). The Garcon Point sites have been subjected to fairly frequent prescribed fire, whereas the Tiger Point site has been fire suppressed for a number of years and is more disturbed, thereby accounting somewhat for the differences in numbers of associates. A number of the associated species at the Florida sites (i.e., *Calamovilfa curtissii*, *Sarracenia leucophylla*, *Pinguicula planifolia*, *Xyris serotina*, *Xyris stricta*) are rare or absent outside of the East Gulf Coastal Plain.

The only other literature documented records of *Cladium mariscoides* south of North Carolina are in Horry County, South Carolina (Radford *et al.* 1968), Dooly County, Georgia (Harper 1905), Baldwin County, Alabama (Mohr 1901, Wilhelm 1984), and a questionable Tennessee record (Underwood, n.d.). Bridges & Orzell (1989) cited specimens from three Texas counties (Anderson, Henderson, and Smith). The ranges of *C. mariscoides* and *C. jamaicense* are known to overlap only on the eastern coast of the Carolinas, from Dare County in North Carolina to Horry County, South Carolina, and at the Florida and Al-

abama disjunct localities. The nearest region to Florida where *C. mariscoides* is known from several adjacent counties (*i.e.*, is regionally frequent to the extent of being documented for most counties by general floristic collecting) is the northern part of Indiana, a distance of at least 1170 km from the region of the Florida disjunctions. Within a 1000 km radius of the western Florida panhandle sites, *C. mariscoides* is known to occur in only ten counties, three of these in Texas (Bridges & Orzell 1989), and at least two others represented by only a single collection over 80 years old. The distribution of *C. mariscoides* in the United States west of New England based on the published literature is shown in Figure 1, with its approximate northern limit in Canada indicated by a dashed line. The portion of the range eastward through New England into Quebec, New Brunswick, and southwest Newfoundland, and a western disjunct population in Saskatchewan, are not shown on Figure 1.

There is some similarity in habitat between the western Florida panhandle sites and the locations for *Cladium mariscoides* in Georgia (Harper 1905), the wetland longleaf pine savanna sites on the North Carolina coastal plain, and with some other locations on the mid-Atlantic Coastal Plain (Sipple & Klockner 1980) and the Delmarva Peninsula (Boone *et al.* 1984). It seems that many of the *C. mariscoides* sites in the southeastern United States are within a short distance of the current shoreline (except the Texas and North Carolina mountain sites). From North Carolina northward *C. mariscoides* commonly occurs in tidally influenced freshwater marshes or in wetlands adjacent to tidal marshes (Alan Weakley, pers. comm.; Sipple & Klockner 1980, 1984). Although the Florida sites are well above tidal influence, they could be affected by major hurricanes.

Newly discovered long distance disjunctions in the flora of the United States may have great significance in the fields of taxonomy, phytogeography, and conservation. Short disjunctions (ca. 100-300 km) can often be expected if suitable habitats for the species exists and can be located, and these kinds of disjunctions are fairly frequently reported in the southeastern United States. Disjuncts separated by moderate length (ca. 300-600 km) usually have significant differences in habitat, geologic history, and landscape ecology from the situations in the more continuous range of the species and therefore become critical in understanding phytogeographic history, patterns of speciation and floristic migration, and conservation needs for the natural communities of the region. Long disjunctions (600-1000 km) must be interpreted with caution to discern whether they represent: 1) recent adventives due primarily to human influence on the flora, 2) chance introductions by natural processes (*e.g.*, bird or wind dispersal of seeds) which might not produce long persistent populations, or 3) longterm stable populations which may represent significant genetic variation and have speciation potential as isolated populations, and may even be relicts of a once more continuous range now isolated by climatic changes.

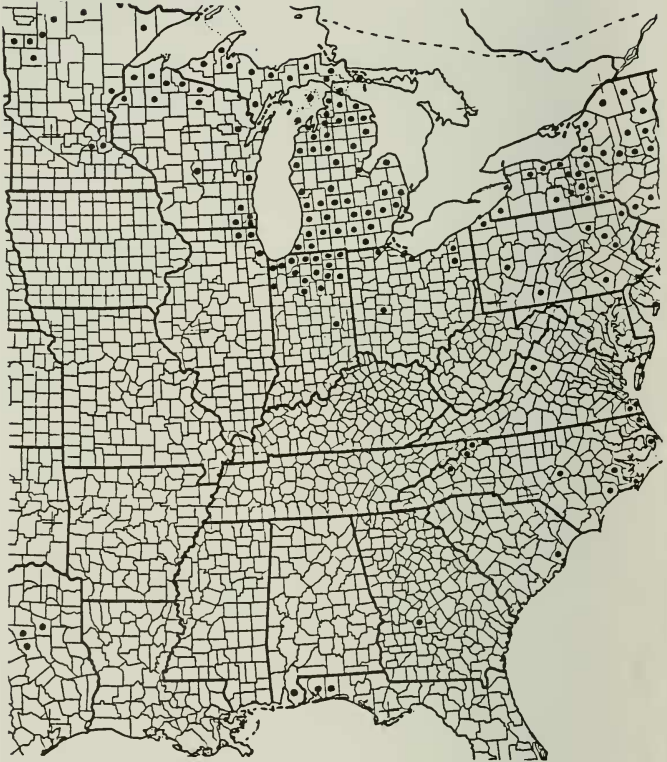


Figure 1: County distribution map for *Cladium mariscoides* in the United States. The approximate range limit in Canada is indicated by a dashed line. The portion of the range eastward through New Jersey, New York, and New England into Quebec, New Brunswick, and southwest Newfoundland, the northern limit in Minnesota and Ontario, and a western disjunct population in Saskatchewan are not shown on the map.

Based on its abundance and relative dominance in little disturbed communities at its southeastern United States locations, we interpret *Cladium mariscoides* as probably relictual in this region. This interpretation is strengthened by the uniqueness of its habitat at the Texas deep muck bog sites (Bridges & Orzell 1989) and North Carolina mountain fens (Schafale & Weakley 1990). These unique habitats are rarely replicated in the region. However, the habitats of the southeastern coastal plain sites are apparently duplicated at hundreds of sites lacking *C. mariscoides* in the intervening area. The rarity of *C. mariscoides* in the coastal plain of Alabama, Florida, Georgia, South Carolina, and North Carolina is as yet difficult to correlate with scarcity or uniqueness of physical habitat parameters. However, there may be some not yet understood correlations with disturbance factors and fire history. All of the Garcon Point sites are frequently burned and *C. mariscoides* responds well to low intensity ground fires, without which in the southeastern coastal plain it may be shaded out by wetland broadleaf evergreen shrubs and trees. Further study will be needed in order to adequately explain the existence of this northern species at the disjunct sites near the Gulf of Mexico.

ACKNOWLEDGMENTS

We thank Richard Hilsenbeck of the Florida Natural Areas Inventory and Guy Nesom of The University of Texas at Austin for their helpful reviews of the manuscript. We appreciate discussions and information on the habitats and county distribution of *Cladium mariscoides* supplied by Alan Weakley for North Carolina, Stephen Young and Al Schotz for New York, and Welby Smith for Minnesota. John Palis of the Florida Natural Areas Inventory graciously provided us with his field notes and a specimen of *Cladium mariscoides* to cite in the paper.

LITERATURE CITED

- Anderson, L.C. 1991. Noteworthy plants from north Florida V. *Sida* 14:467-474.
- Boone, D.D., G.H. Fenwick, & F. Hirst. 1984. The rediscovery of *Oxypolis canbyi* on the Delmarva Peninsula. *Bartonia* 50:21-22.
- Bridges, E.L. & S.L. Orzell. 1989. Additions and noteworthy vascular plant collections from Texas and Louisiana, with historical, ecological, and geographical notes. *Phytologia* 66:12-70.

- Godfrey, R.K. & J.W. Wooten. 1979. *Aquatic and Wetland Plants of the Southeastern United States - Monocotyledons*. Univ. of Georgia Press, Athens, Georgia. 712 pp.
- Harper, R.M. 1905. Phytogeographical explorations in the coastal plain of Georgia in 1904. *Bull. Torrey Bot. Club* 32:451-467.
- Mohr, C. 1901. *Plant Life of Alabama*. Facsimile Reprint (1969). J. Cramer, Stuttgart, Germany. 921 pp.
- Radford, A.E., H.E. Ahles, & C.R. Bell. 1968. *Manual of the Vascular Flora of the Carolinas*. Univ. of North Carolina Press, Chapel Hill, North Carolina. 1183 pp.
- Schafale, M.P. & A.S. Weakley. 1990. *Classification of the Natural Communities of North Carolina*, third approximation. North Carolina Natural Heritage Program, Raleigh, North Carolina. 325 pp.
- Sipple, W.S. & W.A. Klockner. 1980. A unique wetland in Maryland. *Cas-tanea*. 45:60-69.
- . 1984. Uncommon wetlands in the coastal plain of Maryland. pp. 111-138. In A.W. Norden, et al., eds. *Threatened and Endangered Plants and Animals of Maryland*. Maryland Natural Heritage Program, Sp. Publ. 84-I, Annapolis, Maryland.
- Underwood. (n.d.). *Cyperaceae of Tennessee*. Unpublished manuscript version.
- Ward, D.B. 1968. *Checklist of the Vascular Flora of Florida*. Part I. Psilopsida, Lycopsidea, Sphenopsida, Filicinae, Gymnospermae, Monocotyledoneae. Agricultural Experiment Station, Institute of Food and Agricultural Sciences. Tech. Bull. 726. 72 pp.
- Wilhelm, G.S. 1984. *Vascular flora of the Pensacola Region*. Ph.D. Diss., Southern Illinois University. Carbondale, Illinois. 247 pp.